DOCUMENT RESUME

ED 211 394 SO 013 708

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TITLE Cognition Research: Some Implications for the Design of Social Studies Instructional Materials.
PUB DATE 10 Apr 79
NOTE 19p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Cognitive Processes; Cognitive Style; Educational Objectives; *Educational Research; Elementary Secondary Education; Learning Theories; Models; Retention (Psychology); *Social Studies; Student Characteristics; *Textbook Preparation

ABSTRACT

This analysis considers several major areas in which cognition research would seem to have pregnant implications for the conscious design of social studies texts and sketches the ways in which the structure of texts might be shaped if research were applied. The first area discussed is matching texts to significant user characterics. There are at least four learner characteristics that may be profitably considered and which are typically ignored in text design. These are locus of control, conceptual tempo, cognitive style, and predominant mode of learning that is associated with the student's level of maturation. The first three of these characteristics can be measured through paper and pencil tests. Concerning the last characteristics, the instructional implication of research shows that, as children develop, they should be phased through activities that emphasize learning through acting upon phenomena, learning through visual forms of materials, and finally, learning through abstract or symbolic forms. The second area discussed is facilitating retention of key material. Ancient mnemonic techniques such as the pegword device could be incorporated into texts. A number of investigators have established the value of the systematic use of imagery in retaining information. The third area discussed is matching instructional models to learning objectives. The overall structure of texts may be shaped by the conscious use of instructional models. Established models exist and each implies a different organizational pattern for subject matter for efficient learning. (Author/RM)

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"Cognition Research: Some Implications for the Design of Social Studies Instructional Materials"

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Not long ago I attended an AERA-sponsored seminar concerning the linkage between educational research and federal policy making. I was struck by the monotony of the message from processions of bureaucrats, congressional and executive staff members, lobbyists, astute observers of the Washington scene, and even an influential legislator: "Educational research has little or no impact on policymaking". Similar rumblings over the years have echoed from the studies of teacher usage of research (Martorella, 1979 ; Shaver and Others, 1979; Weiss, 1978). Clearly these are disturbing conclusions since policy-makers and practitioners surely must be among the most important groups upon which research should impact.

INTRODUCTION

My basic purpose in this paper is to target still another significant group of policy makers which research appears to have little influenced; namely, those who design instructional materials (Schramm, 1955, p. 158). More narrowly, the focus of my analysis will be confined to one dimension of instructional materials, textbooks, one aspect of research, cognition, and one subject matter area, social studies. If there is a dominant, overidding characteristic of instruction in American schools that transcends subject areas, teacher orientations and regional school variations, it is our obeisance to textbooks as instruments of basic instruction (Shaver and Others, 1979; Clifford, 1978; Weiss and Place, 1978). They have been scorned, reviled and ridiculed -- often unfairly -- scrutinized endlessly in the field of social studies and almost always found to be deficient in some important respect, but they endure (Fitzgerald, 1979; Mayer, 1962; Cronback, 1955), and continue

to serve a major role in instruction, as teachers themselves testify (Weiss, 1979). Their role takes on even greater significance at the elementary level if one draws certain inferences from the fact that among all required subjects taught, social studies is near the bottom in terms of the amount of the teachers' time that is spent on instruction. By inference, the text may carry a disproportionate responsibility for instruction when compared with its secondary counterparts.

It is important to emphasize at the outset that our analysis is not intended as another attack upon insensitive Philistine publishers and their author collaboraters. There are constraints of size, cost and media format under which texts are produced which are enormous and which will likely continue into the 21st Century or until alternative media technological developments render texts financially infeasible.

Furthermore, our concerns do not lie with the extent to which descriptive analyses of texts have shaped or modified their present character. Historically, the careful monitoring by researchers of preceding generations of texts has often alerted publishers to distortions, inaccuracies or oversights and consequently often contributed to needed revisions. Such descriptive research generally is concerned with objectives, political exigencies, and other such standards, but has little to do with clearly verifiable effects of texts. For example, it may be plausibly argued that a text which outlines female stereotyped career roles (as one popular contemporary first-grade social studies text does) should be modified. It is a different issue, however, to argue from research what the effects of such material on cognitive learning are or how such material should be designed.

Fitzgerald (1979, pp. 52, 54) skewers the instructional designer's problem when confronted with such descriptive research in her recent essay:

> The current version of the history of racial minorities in America represents the compromise that the publishers have made among the conflicting demands of a variety of pressure groups, inside and outside the school systems. The compromise is an unhappy one, and it is bound to change in the future, if only because its inconsistencies are so obvious. However, it is interesting to ask at this point what a truly "multiracial, multicultural" history text would look like. The question is an academic one, admittedly, but there are certain organizations, such as the Council on Interracial Books for Children, that do argue it, in an academic way, and that do give certain answers through their criticisms of current texts.

She concludes (1979, p. 54) that, if a text were designed incorporating all the criticisms of existing approaches, "the message of the texts would be Americans have no common history, no common culture, and no common values, and that membership in a racial or cultural group constitutes the most fundamental experience of each individual. The message would be that the center cannot, and should not, hold."

For purposes of our analysis, we will consider texts - for good or for bad - as instructional givens in thousands of classrooms across the United States for many years to come. Our task will be to consider several major areas in which cognition research would seem to have pregnant implications for the conscious design of social studies texts and to sketch the ways in which the structure of texts might be shaped if research were applied.

BOOKS COMPARED WITH TEXTBOOKS

One set of assumptions upon which this analysis is based concerns the instructional distinctions perceived between textbooks and books in general. One of the more obvious ways that a textbook differs from its more conventional book counterparts is that it normally is designed to be a basic, complete and balanced survey of the topic it covers appropriate for the audience it intends to reach. As a basic medium of instruction, a textbook carries a heavier burden than other resources which are intended to be just one source of information among many. Since learning is the primary intended purpose of a textbook, a more precise definition of the potential users is important as a basis for its construction. Typically, characteristics of users that have been used as bases for design have been prior experience with other correlated texts in a series, grade level and reading levels, as defined by mechanical formulae.

Perhaps in most striking constrast to conventional books, texts incorporate a variety of instructional aids ranging from statements of objectives, summaries of chapters, questions correlated with text or at the ends of chapters, activities or projects to be done in conjunction with text, and tests - self or externally administered. The integral function of the text is to consciously instruct in concert with some cognitive, affective or psychomotor objectives that have been determined for the users.

As texts are primarily instructional resources, issues concerning the instrumental efficiency of the design characteristics of a textbook in

producing learning are paramount. Whereas, for a conventional book, issues of cosmetic appeal, narrative plot developments, the fluid chronological flow of events, and the potential for interesting serendipitous insights may be overriding ones. The acid test of the validity of the features and organization of a textbook is the extent to which it efficiently and effectively achieves intended learning objectives.

COGNITION RESEARCH AND THE DESIGN OF TEXTS

Research into the area of how individuals think and how instruction may be most effectively organized to aid in the process consistent with a given set of objectives has led to a number of significant findings. The assumptions of such research were outlined recently by Wittrock (1979, pp. 5, 10).

> A cognitive approach implies that learning from instruction is scientifically more productively studied as an internally, cognitively mediated process than as a direct product of the environment, people, or factors external to the learner. The approach involves understanding relations or interactions between the relations or interactions between the learner's cognitive process and aptitudes, such as attribution, motivation, encoding, memory, cognitive styles and cognitive structures, and the characteristics of instructional treatments.
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> .....
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> (L)earners have active roles in instruction and a new responsibility for learning. They are not passive consumers of information, and learning does not occur automatically when teachers give our information. Even when learners are given the information they are to learn, they still must discover its meaning. In the process they use their information processing strategies, memories, and attentional and motivational mechanisms to organize and understand it. This perspective means that instructional treatments and intervention programs influence how people think and feel, which, in turn, influence their behavior.

When a textbook is viewed primarily as a basic form of instruction and a commitment is made to employ cognitive models derived from research in its design, a number of implications follow. We will outline three of the more salient areas in which improvements based upon cognition research seen possible and fruitful for exploration: matching texts to significant user characteristics, facilitating retention of key material, and matching instructional models to learning objectives.

Matching Texts to Significant User Characteristics

From an instructional perspective, there are at least four learner characteristics that may be profitably considered and which are typically ignored in text design. Three of these are closely related and are identified as locus of control, conceptual tempo and cognitive style. A fourth characteristic considers the dominant developmental stage or predominant mode of learning that is associated with a student's level of maturation.

In brief, locus of control indicators purport to reflect individuals' expectations either that the world around them is controllable and subject to their influence or that their fates are determined largely by chance or external forces (Robinson and Shaver, 1969, p. 62). Conceptual tempo measures tap a different dimension of personality, indicating the basic way in which an individual approaches the resolution of a problem and the relative degree of success consistently experienced in generating solutions (Greer and Blank, 1977). For example, a student who typically takes time to ponder the solution to a problem and who also usually gets a high percentage of correct answers would be designated

as "reflective". Conversely, one who usually answers rapidly and typically with a high error rate would be labeled "impulsive".

Cognitive-style measures offer a profile of individuals' dominant modes of organizing and processing information. "They refer to individual differences in how we perceive, think, solve problems, learn, relate to others, etc. (Witkin and Others, 1977, p. 15)." While a variety of different systems for categorizing cognitive styles currently exist, one of the more widely researched schemas is that of Witkin and his asociates (1977). Classifying styles as "field-dependent" and "field-independent", Witkin's system differentiates between those who process information in analytical fashion without dependence on external environmental clues (independent) and those who are unable to isolate and process data out of the context of their surrounding environment (dependent).

All three of these related measures may be obtained through paper and pencil tests. What they provide cumulatively for instructional purposes are indicators of whether students are likely to function more effectively with an openended versus a more highly structured instructional experience and of who needs more prompting and encouragement to analyze the quality of answers versus those who can bring their own effective problem solving strategies to material. At one extreme are learners capable of setting their own goals, motivating themselves as they proceed and setting up their own procedures for the achievement of objectives, and who work well independently. While at the other end of the continuum are those who require explicitly defined goals, periodic reinforcement from external sources and who operate most effectively with

a clearly specified plan and assistance from others. There are a variety of other different and subtle characteristics of learners that are related to the three typlolgies, but the ones described should suffice to make the point.

Given a common set of learning objectives and subject matter domain, it is possible to at least construct a scenario for text design where two basic alternatives are offered. Both may make similar assumptions about ability variations, prior knowledge and reading levels. One, however, lays out with some specificity what is to be learned, adds periodic cues and reinforcements, as well as considerable structure, and incorporates activities which call for sharing and working with others. The other, in essence, is more open-ended and permits more self-direction and individual freedom in organizing learning.

Matching texts with the developmental characteristics of learners requires a different level of concern. Essentially, young learners are making a transition from one preferred or most effective mode of learning to another enroute to adulthood. They move from a preference for kinesthetic or motor modes of learning during preschool years, to preferences for visual modes, and then verbal modes (Bissel and Others, 1971). Bruner (1973) has characterized these three sequential modes as enactive, iconic, and symbolic. The instructional implication of such modality shifts is that, as children develop, they should be phased through activities that emphasize learning through acting upon phenomena, learning through visual forms of material, and finally, learning through abstract or symbolic forms. One study (Meinke and Others, 1975) using social studies material offers some support for this paradigm. Using

fourth, sixth, and eighth graders as subjects. Meinke and his associates found that abstract thinkers did significantly better than concrete thinkers on criterion measures of learning of the concepts freedom, justice, nonfreedom, and nonjustice. Furthermore, scores improved as a function of grade level. Levin (1976) also demonstrated that children were better able to remember pictures than the names of objects. Sommer (1958, p. 57) has summarized, some of the related research in this area as follows: "People who see an actual object are likely to remember it better than people who see only a picture of an object, and they in turn will remember it better than those who only see the name of the object, and the least effective learning will occur if people see only the name of an abstract concept."

As a minimum, a sensitivity to the developmental characteristics of learners would provide suitable learning modalities. Currently, such considerations do not appear to be consistently reflected in typical social studies materials, particularly in basal texts (Martorella, 1978). Perhaps the most important application of developmental research to social studies lies in recognition of the differential capabilities of students to process highly symbolic or abstract data and to learn material through primarily symbolic forms such as written texts. Developmental research suggests that learning problems will occur as long as basal texts emphasizing symbolic forms continue to dominate and remain the nearly exclusive medium of social studies instruction through the elementary and middle-school grades.

Facilitating Rentention of Key Material

There are many facets to retention and memory, including the varieties of memory that we possess. Our focus in this section is upon but a few basic issues related to the topic. How do we design texts to cause students initially to attend to material, later to isolate salient items for processing accurately, to efficiently and meaningfully relate them to one another and to other elements of knowledge they possess, and finally at a later date to be able to reproduce the material upon need with a low error rate.

Ancient mnemonic techniques such as the pegword device (Sommer, 1978) could be incorporated into texts to assist the learner in coping with long serial lists of information. Bower (1970) believes that many of the discrepancies between poor and superior achievers in some classroom situations can be removed by providing poor achievers with such mnemonic assistance. The simple process of cueing students in the form of preliminary or text-imbeded questions (Anderson and Biddle, 1975), as well as other forms of prompts, has been shown to improve performance on cue-related material (Frase, 1978; 1972; Kaplan, 1976).

Besides the work of Sommer (1978), a number of investigators have established the value of the systematic use of imagery in retaining information (Perlmutter and Myers, 1975; Paivio, 1971; Attwood, 1971). In summary, Sommer (1978, p. 57) notes that, "When people are shown a list of words, those that are high in imagery are recalled more readily than abstract words such as word, such and explain." Texts could provide linkages of words high in imagery, as well as encourage the learners use of imagery in the learning of material.

Wittrock (1979, p. 10) sums up by suggesting:

> If learners either cannot or are unlikely to generate relevant relations between information and experience, either with or without instructions to construct them, then the relations can be made explicit or suggested by verbal devices such as stories, topics, headings, metaphors, similes, analogies, statements of rules, examples, and imaginal devices such as pictures, diagrams, flow charts, and paintings.

Matching Instructional Models to Learning Objectives

Apart from incorporating devices that prompt or alert the learner to attend carefully, the overall structure of texts or the sequencing of material may be shaped by the conscious use of instructional models. All instruction, regardless of its objectives, implicitly reflects some organizational scheme and pattern of sequencing. Point B follows point A; element X is presented in one fashion and not another; some points that the instructor might have included were ignored while others were chosen; a great deal of time is spent on some aspects of a topic, very little on others. Such designs may be self-consciously constructed or may be haphazardly injected.

Among the many learning objectives for social studies texts, paramount are those concerning problem-solving, generalizations, factual conclusions, and concepts. For all of these objectives, established instructional models exist and each implies a different organizational pattern for subject matter for efficient learning. To illustrate, let us consider the teaching of facts and concepts. Principles for organizing and sequencing instruction to facilitate factual learning have been widely reported.

and summarized (Underwood, 1964, 1959; Dixon and Horton, 1968; DeCecco, 1968; Gagne, 1970). Similarly, there are a number of extensive reviews of research related to instructional patterns for concept learning (Glaser, 1968; Sax, 1969; Klausmeier and Hooper, 1974), as well as detailed summaries of instructional guidelines derived from such research (Markle and Tiemann, 1976, 1969; Markle, 1975; Martorella, 1977, 1978, 1979; Klausmeier and Others, 1974). The net result is a rather extensive set of prescriptions concerning conceptual instruction.

A well-established skeletal model for factual learning suggests that in texts we should move a student from attending to or discriminating stimuli to be learned, to practicing the material, to the actual learning experience, followed by overlearning. Along the way, mediators may be introduced to help organize material to be learned; periodic reinforcement should be given to keep the learner at the task; and feedback should be given as needed.

In contrast, a skeletal model for concept learning suggests that careful preassessment of the concept rule and criterial attributes should precede instruction; students should be introduced to a number of examples and nonexamples selected on the basis of the preassment; and students should be helped in attending to the relevant dimensions of the concept. Several levels of mastery are possible. Further, if all the findings from the various concept studies were accumulated, instructional design of texts would incorporate the following recommendations.

(1) At some point, instruction should include a definition which is stated in terms that are meaningful to the learner.

(2) Some strategy should be included to help the learner determine whether items are examples or nonexamples, and whether attributes are criterial or noncriterial.

(3) Unless students know the criterial attributes of a concept, they should be taught them prior to or concurrently with instruction.

(4) Some opportunity to practice or experiment with the cases should be included.

(5) Feedback on the correctness or incorrectness of responses should be provided.

(6) For young children, pictures or other visual stimuli, rather than verbal stimuli, should be used where possible.

CONCLUSION

There is much that can be done to design social studies texts to more consistently incorporate cognitive models of instruction derived from research. We have touched only upon three major areas in which desirable improvements seem possible. If the textbook remains, as it seem likely to, the primary instrument of social studies instruction, its producers will continue to bear an awesome instructional responsibility. Perceived as an <u>instructional program</u> rather than merely a conventional book, it has many objectives to achieve.

Research can play a broader role than its traditional one of providing acceptable standards of scholarship for social studies texts. Existing research provides some models for how instruction in general might be improved and how specifically the construction of texts might develop in different patterns than existing ones. Further, cognition research offers new directions in which future studies of social studies texts might proceed.

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